AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application.

1. (Currently amended) A method of acquiring ultrasound response data for vascular tissue, comprising:

~~inserting at least a portion of a catheter into~~maneuvering at least a portion of a catheter through a vascular structure to a first location for acquiring ultrasound echoes from a first portion of vascular tissue;

~~activating a transducer portion of said catheter, said activation of said transducer portion resulting in an ultrasound signal being transmitted toward vascular tissue;~~

transmitting an ultrasound signal toward the first portion of vascular tissue and acquiring first backscattered ultrasound data ~~from said vascular tissue~~therefrom;

using at least a portion of said first backscattered ultrasound data and an algorithm incorporating an estimate of a tissue component of backscattered ultrasound data to estimate ~~the~~a first transfer function of said catheter ~~while said catheter is inside said vascular structure~~; and

calculating first ultrasound response data using at least said first transfer function, ~~to calculate ultrasound response data for said vascular tissue, wherein~~ said first ultrasound response data ~~is~~being (i) indicative of data that is backscattered from ~~said~~ vascular tissue and (ii) substantially independent from ultrasound data modifications resulting from said catheter.

2. (Currently amended) The method of claim 1, further comprising the step of filtering noise from said first backscattered ultrasound data.

3. (Original) The method of claim 1, wherein said algorithm is an iterative algorithm that is time-invariant over small intervals.

4. (Currently amended) The method of claim 1, wherein said step of using at least a portion of said first backscatter ultrasound data and said algorithm to estimate the first transfer function of said catheter ~~further~~ comprises the step of using an error-criteria algorithm and a least-squares-fit algorithm to estimate ultrasound response data for said vascular tissue and said first transfer function of said catheter, respectively.

5. (Currently amended) The method of claim 4, further comprising the step of using said estimated ultrasound response data and said calculated first ultrasound response data to calculate final ultrasound response data for ~~said~~ vascular tissue.

6. (Currently amended) The method of claim 1, further comprising the step of using at least said first ultrasound response data to produce an ultrasound image of ~~at least said~~ vascular tissue.

7. (Currently amended) The method of claim 1, further comprising the steps of:

identifying a plurality of parameters of said first ultrasound response data; and

using said plurality of parameters and previously stored histology data to characterize at least a portion of said vascular tissue.

8. (Currently amended) The method of claim 7, further comprising the steps of:

transforming said first ultrasound response data from ~~the~~a time domain into ~~the~~a frequency domain; and

identifying at least two of said plurality of parameters from the frequency spectrum of said first ultrasound response data.

9. (Currently amended) The method of claim 8, wherein said step of identifying said at least two of said plurality of parameters further comprises said at least two parameters being selected from athe group consisting of: maximum power, minimum power, frequency at maximum power, frequency at minimum power, y intercept, slope, mid-band fit, and integrated backscatter.

10. (Currently amended) The method of claim 7, wherein said step of using said plurality of parameters and previously stored histology data to characterize at least a portion of said vascular tissue further comprises using said plurality of parameters and said previously stored histology data to identify a tissue type of at least a portion of said vascular tissue, said tissue type being selected from athe group consisting of: fibrous tissues, fibro-lipidic tissues, calcified necrotic tissues, and calcific tissues.

11. (Original) The method of claim 10, further comprising the step of using at least said identified tissue type to produce a tissue-characterization image of at least said portion of said vascular tissue on a display.

12. (Currently amended) The method of claim 1, further comprising the steps of:

~~transmitting a second ultrasound signal toward a tissue portion of said vascular structure, said tissue portion being at least partially distinct from said vascular tissue;~~

~~acquiring ultrasound data backscattered from said tissue portion;~~

~~using at least a portion of said ultrasound data and said algorithm to estimate a second transfer function of said catheter while said catheter is inside said vascular structure; and~~

~~using at least said second transfer function to calculate response data for said tissue portion~~

repositioning the at least a portion of the catheter through the vascular structure to a second location for acquiring ultrasound echoes from a second portion of vascular tissue;

transmitting an ultrasound signal toward the second portion of vascular tissue and acquiring second backscattered ultrasound data therefrom;

using at least a portion of said second backscattered ultrasound data and an algorithm incorporating an estimate of a tissue component of backscattered ultrasound data to estimate a second transfer function of said catheter; and

calculating second ultrasound response data using at least said second transfer function, said second ultrasound response data being (i) indicative of data that is backscattered from vascular tissue and (ii) substantially independent from ultrasound data modifications resulting from said catheter.

13. (Currently amended) An intravascular-ultrasound (IVUS) data-acquisition system, comprising:

a catheter comprising at least one transducer and adapted to transmit an ultrasound signal and to receive a backscatter of said ultrasound signal; and

a computing device ~~electrically~~ connected to said catheter and comprising a physical computer-readable medium including computer-executable instructions for a transfer-function application that is adapted to:

receive backscattered ultrasound data corresponding to the backscattered ultrasound signal from said catheter, said backscattered ultrasound data being backscattered from vascular tissue within a vascular structure;

estimate ~~the~~ a transfer function of said catheter from said backscattered ultrasound data and an algorithm incorporating an estimate of a tissue component of backscattered ultrasound data; and

determine ultrasound response data for ~~said~~ vascular tissue, said ultrasound data being a function of at least said transfer function and ~~said~~ backscattered ultrasound ~~response~~ data received by the catheter.

14. (Original) The IVUS-data-acquisition system of claim 13, wherein said transfer-function application is further adapted to calculate said ultrasound response data from said ultrasound data and said transfer function.

15. (Original) The IVUS-data-acquisition system of claim 13, wherein said transfer-function application is further adapted to estimate said ultrasound response data from said ultrasound data.

16. (Currently amended) The IVUS-data-acquisition system of claim 15, wherein said transfer-function application is further adapted to:

estimate a first set of ultrasound response data from said backscattered ultrasound data;

calculate a second set of ultrasound response data from said ultrasound data and said transfer function; and

use said first and second sets of ultrasound response data to calculate said ultrasound response data.

17. (Original) The IVUS-data-acquisition system of claim 13, wherein said transfer-function application is further adapted to filter noise from said ultrasound data, said ultrasound data being a function of at least said transfer function, said ultrasound response data, and said noise.

18. (Original) The IVUS-data-acquisition system of claim 13, wherein said transfer-function application is further adapted to estimate the transfer function of said catheter through the use of an iterative algorithm that is time-invariant over small intervals.

19. (Currently amended) The IVUS-data-acquisition system of claim 18, wherein said transfer function application is further adapted to estimate the transfer function of said catheter through the use of at least one algorithm~~, said at least one algorithm being~~ selected from a list consisting of an error-criteria algorithm and a least-squares-fit algorithm.

20. (Original) The IVUS-data-acquisition system of claim 13, wherein said catheter further comprises an array of transducers circumferentially positioned around said catheter.

21. (Currently amended) The IVUS-data-acquisition system of claim 13, wherein said computing device further comprises:

a database adapted to store a plurality of parameters corresponding to a plurality of vascular tissue types; and

a characterization application ~~electrically connected to said database and said transfer-function application and~~ adapted to:

receive said ultrasound response data;

transform said ultrasound response data into the frequency domain;

analyze said transformed signal for a plurality of identifiable parameters; and

use said plurality of identifiable parameters and at least a portion of said plurality of parameters stored in said database to characterize at least a portion of said vascular tissue.

22. (Currently amended) The IVUS-data-acquisition system of claim 21, wherein said database is further adapted to store at least two parameters corresponding to said plurality of vascular tissue types, said at least two parameters being selected from athe group consisting of: maximum power, minimum power, frequency at maximum power, frequency at minimum power, y intercept, slope, mid-band fit, and integrated backscatter.

23. (Currently amended) The IVUS-data-acquisition system of claim 21, wherein said characterization application is further adapted to use said plurality of identifiable parameters and said at least a portion of said plurality of parameters stored in said database to identify the tissue type of said at least a portion of said vascular tissue, said tissue types being selected from athe group consisting of fibrous tissues, fibro-lipidic tissue, calcified necrotic tissues, and calcific tissues.

24. (Currently amended) The IVUS-data-acquisition system of claim 23, wherein said computing device further comprises a display for ~~imaging~~visually presenting said at least a portion of said vascular tissue in a color corresponding to said tissue type.

25. (Original) The IVUS-data-acquisition system of claim 13, wherein said catheter is further adapted to transmit multiple ultrasound signals and to receive multiple backscatters therefrom while said catheter is within a particular vascular structure, and said transfer-function application is further adapted to:

receive said backscatters from said catheter;

estimate multiple transfer functions of said catheter from said backscattered data; and

use said multiple transfer functions to determine multiple sets of response data.

26. (Currently amended) A vascular-tissue-characterization system, comprising:

a catheter comprising at least one transducer and adapted to transmit an ultrasound signal and to receive a backscatter of said ultrasound signal;

an intravascular ultrasound (IVUS) console ~~electrically~~ connected to said catheter and adapted to receive ultrasound data from said catheter, said ultrasound data being backscattered from vascular tissue after the catheter is maneuvered into a vascular structure;

a ~~transfer-function~~transfer function application, comprising computer-executable instructions stored on a computer-readable medium, adapted to:

use ~~the ultrasound data~~ backscattered ultrasound data from said vascular tissue and an algorithm incorporating an estimate of a tissue component of backscattered ultrasound data to estimate ~~the~~a transfer function of said catheter; and

use at least said transfer function to calculate a ~~response-data~~response data portion of ~~said~~ ultrasound data received from the catheter; and

a computing device ~~electrically~~ connected to said IVUS console, comprising:

a database adapted to store a plurality of parameters corresponding to a plurality of vascular tissue types; and

a characterization application ~~electrically connected to said database and~~ adapted to:

analyze said response-data portion of said ultrasound data for a plurality of identifiable parameters; and

use said plurality of identifiable parameters and at least a portion of said plurality of parameters stored in said database to characterize at least a portion of said vascular tissue.

27. (Currently amended) The vascular-tissue-characterization system of claim 26, wherein said ~~transfer-function~~transfer function application is operating on said computing device.

28. (Currently amended) The vascular-tissue-characterization system of claim 26, wherein said ~~transfer-function~~transfer function application is operating on said IVUS console.

29. (Currently amended) The vascular-tissue-characterization system of claim 26, wherein said ~~transfer-function~~transfer function application is further adapted to filter noise from said ultrasound data.

30. (Original) The vascular-tissue-characterization system of claim 26, wherein said catheter further comprises an array of transducers circumferentially positioned around said catheter.

31. (Original) The vascular-tissue-characterization system of claim 26, wherein said catheter further comprises a single transducer adapted for rotation about said catheter.

32. (Currently amended) The vascular-tissue-characterization system of claim 26, wherein said characterization application is further adapted to transform said ~~response-data~~response data portion of said ultrasound data into the frequency domain.

33. (Original) The vascular-tissue-characterization system of claim 26, wherein said computing device further comprises a display and said characterization application is further adapted to produce an image of said at least a portion of said vascular tissue on said display.

34. (Currently amended) The vascular-tissue-characterization system of claim 26, wherein said catheter is further adapted to transmit multiple ultrasound signals and to receive multiple backscatters therefrom while said catheter is within a particular vascular structure, and said transfer-function application is further adapted to:

use said backscatters to estimate multiple transfer functions of said catheter; and

use at least said multiple transfer functions to calculate ~~response-data-portions~~response data portions of said backscatters.